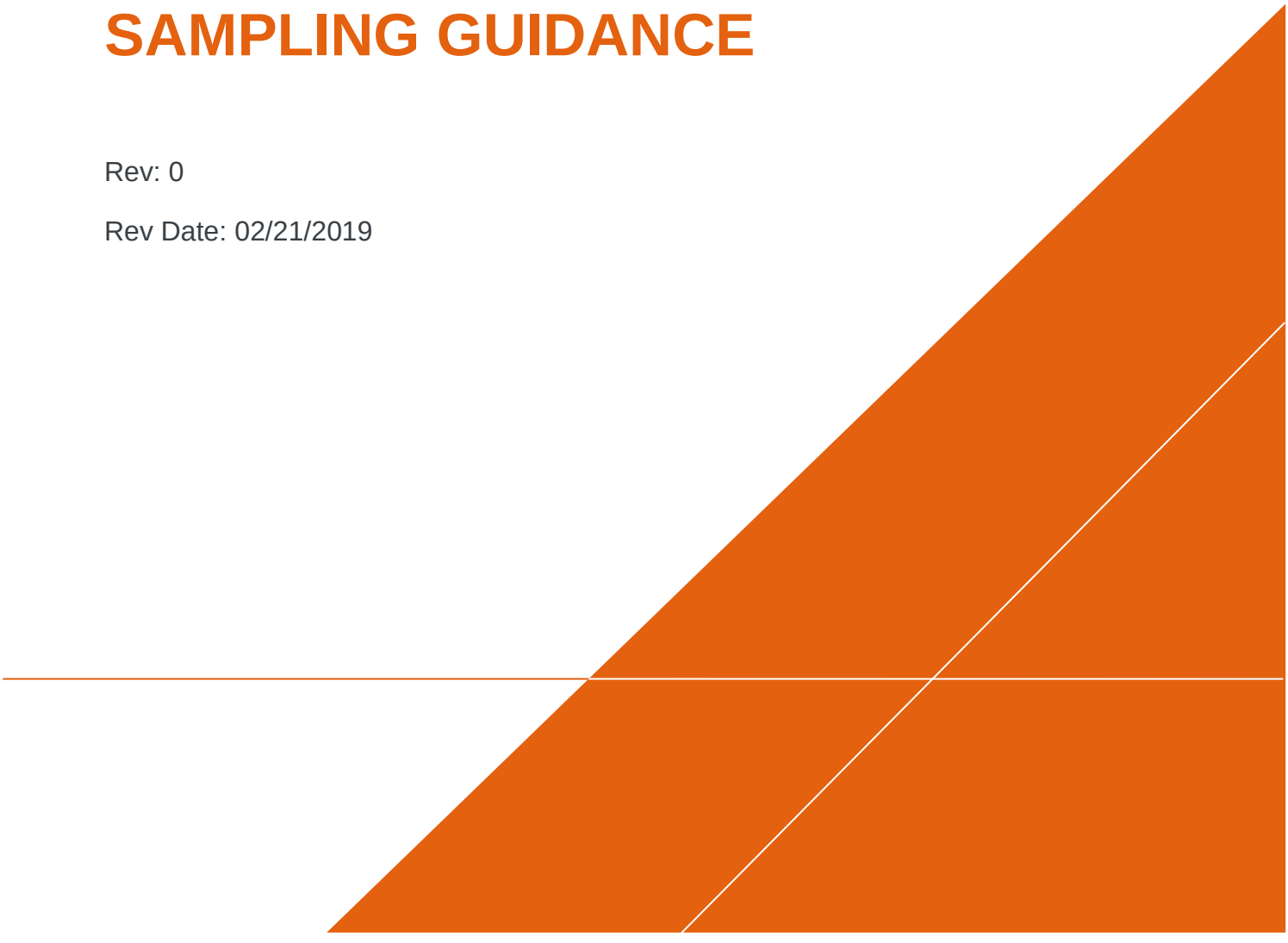
ARCADIS Design & Consultancy for natural and built assets

TGI - DOMESTIC WELL SAMPLING POLY- AND PERFLUORINATED ALKYL SUBSTANCES (PFAS) FIELD SAMPLING GUIDANCE

Rev: 0

Rev Date: 02/21/2019



VERSION CONTROL

Revision No	Revision Date	Page No(s)	Description	Reviewed by
0	02, 21, 2019			Technical Expert Name Procedure Librarian Name

APPROVAL SIGNATURES

Prepared by:	Insert signature here	02/19/2019
	Eric Killenbeck	Date:
Reviewed by:	Insert signature here	02/19/2019
	Lisa Szegedi	Date:

1 INTRODUCTION

This document describes general and/or specific procedures, methods, actions, steps, and considerations to be used and observed by Arcadis staff when performing work, tasks, or actions under the scope and relevancy of this document. This document may describe expectations, requirements, guidance, recommendations, and/or instructions pertinent to the service, work task, or activity it covers.

It is the responsibility of the Arcadis Certified Project Manager (CPM) to provide this document to the persons conducting services that fall under the scope and purpose of this procedure, instruction, and/or guidance. The Arcadis CPM will also ensure that the persons conducting the work falling under this document are appropriately trained and familiar with its content. The persons conducting the work under this document are required to meet the minimum competency requirements outlined herein, and inquire to the CPM regarding any questions, misunderstanding, or discrepancy related to the work under this document.

This document is not considered to be all inclusive nor does it apply to all projects. It is the CPM's responsibility to determine the proper scope and personnel required for each project. There may be project- and/or client- and/or state-specific requirements that may be more or less stringent than what is described herein. The CPM is responsible for informing Arcadis and/or Subcontractor personnel of omissions and/or deviations from this document that may be required for the project. In turn, project staff are required to inform the CPM if or when there is a deviation or omission from work performed as compared to what is described herein.

In following this document to execute the scope of work for a project, it may be necessary for staff to make professional judgment decisions to meet the project's scope of work based upon site conditions, staffing expertise, regulation-specific requirements, health and safety concerns, etc. Staff are required to consult with the CPM when or if a deviation or omission from this document is required that has not already been previously approved by the CPM. Upon approval by the CPM, the staff can perform the deviation or omission as confirmed by the CPM.

2 SCOPE AND APPLICATION

The purpose of this Technical Guidance Instructions (TGI) is to provide guidance on domestic well sampling for poly-and perfluorinated alkyl substances (PFAS) in private wells.

Given the extremely low detection limits associated with PFAS analysis and the many potential sources of trace levels of PFAS, field personnel are advised to err on the side of caution by strictly following these protocols, frequently replacing nitrile gloves, and rinsing field equipment to help mitigate the potential for false detections of PFAS. Other specific items related to field sampling for PFAS are discussed in the sections below.

This document does not address water quality parameter measurements (e.g., specific conductivity, temperature, pH, ORP), sample preservation/packaging, chain-of-custody forms, or laboratory analysis. SOPs for these are included in the Programmatic QAPP and the site-specific Health and Safety Plan (HASP), as appropriate.

3 PERSONNEL QUALIFICATIONS

Arcadis field sampling personnel will have completed and will have current health and safety training as required by Arcadis, the client, or regulations, such as 40-hour HAZWOPER training and/or OSHA HAZWOPER site supervisor training. Arcadis personnel will also have current training as identified in the site-specific HASP which may include first aid, cardiopulmonary resuscitation (CPR), Blood Borne Pathogens (BBP) as needed. The HASP will also identify any access control requirements.

Prior to mobilizing to the field, the sampling team will review and be thoroughly familiar with relevant site-specific documents including but not limited to the QAPP, HASP, historical information, and other relevant site documents.

Arcadis field sampling personnel will be knowledgeable in the relevant processes, procedures, and TGIs and possess the demonstrated required skills and experience necessary to successfully complete the desired field work. Additionally, the groundwater sampling team will review and be thoroughly familiar with documentation provided by equipment manufacturers and become familiar with the operation of (i.e., hands-on experience) all equipment that will be used in the field prior to mobilization.

Ideally, Arcadis personnel directing, supervising, or leading groundwater sample collection activities will have a minimum of one (1) year of previous groundwater sampling experience. Field employees with less than six (6) months of experience will be accompanied by a supervisor (as described above) to ensure that proper sample collection techniques are employed.

4 EQUIPMENT LIST

The following equipment and materials must be available for sampling:

- Site plan of sampling locations, relevant work plan (or equivalent), and this TGI;
- Appropriate health and safety equipment, as specified in the site HASP;
- Dedicated plastic sheeting (preferably high-density polyethylene [HDPE]) or other clean surface to prevent sample contact with the surfaces;
- Conductivity/temperature/pH meter;
- Dissolved oxygen meter, oxidation reduction potential meter, and turbidity meter;
- Brushes for scrubbing sampling equipment;
- Pens and pencils for writing;
- Clipboards, field binders, and field note pages that are not waterproof;
- Labeled sample bottles:
    - Water: HDPE bottles fitted with polypropylene screw cap only; some types of PFAS samples (primarily drinking water) may require preservative, which will be indicated by the laboratory conducting the analysis. The laboratory will specify the sample bottle volume.
- Ziploc® bags to hold ice and samples;

- Appropriate blanks (field reagent blanks supplied by the laboratory);
- Appropriate transport bottles (coolers) with ice and appropriate labeling, no blue ice;
- Deionized water for initial decontamination rinsing;
- "PFAS-free" water provided by the laboratory for final decontamination rinsing;
- Packing and shipping materials;
- Groundwater Sampling Log; and
- Chain-of-Custody (COC) Forms.

5 CAUTIONS

5.1 Food Packaging

Some food packaging may be treated with PFAS-containing chemicals to prevent permeation of oil and water in the food outside of the packaging. To avoid potential food packaging-related PFAS contact:

- Do not bring any food outside of the field vehicles onsite and eat snacks and meals offsite.
- Wash hands after eating.
- Remove any field garments or outer layers prior to eating. Do not put them back on until done eating and hands are washed.

5.2 Field Gear

5.2.1 Clothing

Many types of clothing are treated with PFAS for stain and water resistance, in particular outdoor performance wear under brand names such as Gore-Tex®. To avoid potential clothing-related PFAS contact:

- Do not wear any outdoor performance wear that is water or stain resistant, or appears to be. Err on the side of caution.
- Wear pre-laundered (multiple washings, i.e. 6+) clothing that is not stain resistant or water proof.
- Natural fabrics such as cotton are preferred. Synthetic fabrics may also be acceptable if there is no indication on the label that the fabric is water and stain resistant.
- Most importantly, avoid contacting your clothing with sampling equipment, bottles, and samples.

5.2.2 Personal Protective Equipment

5.2.2.1 Safety Footwear

Some safety footwear has been treated to provide a degree of waterproofing and increased durability, and may represent a source of trace PFAS. For the health and safety of field personnel, footwear must be protected at all times to avoid potential PFAS contamination. To do this:

- Do not touch your safety footwear in the immediate vicinity of the sampling port (i.e., within 10 meters [m]).
- Do not allow gloves used for sampling to come in contact with safety footwear.

5.2.2.2 Nitrile Gloves

- Wear disposable nitrile gloves at all times. Don a new pair of nitrile gloves **before** the following activities at each sample location:
- Decontamination of re-usable sampling equipment;
- Contact with sample bottles or “PFAS-free” water bottles;
- Insertion of anything into the sample ports (e.g., HDPE tubing); and
- Handling of any quality assurance/quality control (QA/QC) samples including field blanks and equipment blanks.

Don a new pair of nitrile gloves after the following activities:

- Handling of any non-dedicated sampling equipment;
- Contact with contaminated surfaces; or
- When judged necessary by field personnel

5.3 Personal Hygiene

- Shower at night.
- Do not use personal care products after showering such as lotions, makeup, and perfumes, UNLESS medically necessary.
- Use sunscreen and insect repellent ONLY if necessary for health and safety. If they are necessary, apply sunscreen and repellant prior to initiating field sampling. If sunscreen and/or repellant need to be reapplied, ensure a safe distance away from the sampling locations and equipment (i.e., more than 10 m away). Wash hands after application.

5.4 Visitors

Visitors to the site are asked to remain at least 10 m from sampling areas.

6 HEALTH AND SAFETY CONSIDERATIONS

- Field activities must be performed in accordance with the site HASP, a copy of which will bepresent onsite during such activities.
- Work will be conducted on private properties, not under the control of Arcadis. Prior to conducting any work, the field crew shall develop a property-specific job hazard analysis that identifies any property-specific hazards (e.g., toys throughout lawn, unsafe stairs into property).

7 PROCEDURE

Arcadis staff will coordinate a sample date and time to sample the private well with the owner of the well. Unless otherwise specified, in writing, by the owner, all contact will be directly with the owner and not a property tenant. Upon arrival, Arcadis will provide introductions and let the resident/property owner know the purpose is to collect a potable well sample for PFAS analysis in accordance with previous correspondence provided to them regarding the sampling. Arcadis will request information from the property owner regarding the water system at each property. Information that will be recorded includes presence of water softeners, sediment traps, filters, etc., and the location of these items.

Additional activities to be performed and procedures to be followed by the sampling team prior to potable well sample collection include:

- Don a new set of nitrile gloves immediately prior to sampling.
- Do not use gloved hands to subsequently handle papers, pens, clothes, etc., before collecting samples.
- Use the 2-250 mL HDPE bottles that are supplied by the laboratory for each sample location.
- Samples bottle caps must remain on the bottle until immediately prior to sample collection, and the bottle must be sealed immediately after sample collection.
- Drinking Water Sampling Protocol: At each sampling location, the sampling team will wash and dry hands thoroughly with a clean towel prior to donning new non-powdered disposable nitrile gloves and then proceed to collect samples per the Army Guidance (A1 and A2) as below:
- The team will first remove any aerator, diffuser, tubing, splash guard, or any other fittings from the faucet to be sampled.
- The team will then flush the faucet at fast full flow for approximately 5 minutes, after which, they will reduce the tap water flow to a pencil-width stream.
- If the faucet or water source access point is for an infrequently used water source, the field team will ensure continuous purging of water for at least 15 minutes before reducing the flow to a pencil-width stream for sample collection.

- For sample collection, the field team will first check to make sure that each of the three 250-mL polypropylene sample containers include the preservative powder (Trizma). If a FTB is required to be collected at the location per the UFP-QAPP, the field team will also check that an FTB container filled with laboratory-prepared reagent water and an empty FTB bottle without any preservative are also available for that sample.
- The field team will then fill each sample container carefully to the bottom of the neck to avoid any overfilling and spillage of the preservative. The field team will make sure to not touch the inside of the polypropylene bottle caps or around the edge of the bottle during sample collection or allow them to encounter the faucet. The sample container will then be recapped, and inverted several times until the preservative is thoroughly mixed with the sample water. The same steps will be repeated to fill the other two field sample containers for the same sample location.
- The tap will be shut off after the sample collection.
- If a FTB is required, the field team will then proceed with opening the FTB container filled with laboratory-prepared reagent water and the empty FTB bottle, and pour the contents of the full FTB container into the empty FTB container.
- After sample collection, the team will label each sample container (including FTB, if applicable) using a pen or pencil with the sample ID, date and time of sample collection, installation name, sampler's name and other pertinent information.
- The field team will then place all sample containers from one sample location grouped together in a polyethylene bag in the sample cooler packed with double-bagged wet ice.
- The field team will then fill out the required forms provided in the field sampling documentation kit including sample collection forms and sample location notation forms.
- The field team will also note the relevant details associated with sample collection in their dedicated non-waterproof log books. At a minimum, they will note the names of sampling personnel, location where sample was collected, sample identification number or name, date and time when the sample was collected, descriptions of components removed prior to purging the tap, and any issues that occurred.

During Sample Collection

Potable water outfalls and taps are likely to vary. If possible, the team will avoid sampling from any taps fitted with Teflon tape or other PFAS-containing materials. Stainless steel and polyvinyl chloride materials are acceptable. The sampling team will collect unfiltered samples from a tap or port, as follows:

- Initiate flow from the water source and allow the system to flush for at least 3 minutes.
- Collect the sample into the HDPE bottle until the sample bottle is full (leaving slight headspace in the bottle is acceptable).
- Tightly screw on the polypropylene or HDPE cap.

After Sample Collection

Upon collection, the sample bottles will be placed in a sealed Ziploc® bag. Sample collection information will be recorded including the sample identification (ID) and time of sampling on the sample bottle label, in the field notes, and on the chain-of-custody (COC) form. The COC form will be explicitly marked for expedited analysis with a standard turnaround time (approximately 3 weeks). Samples will be placed in durable coolers, with enough ice to keep the sample temperature between 0 and 4ºC until delivered to the laboratory. Only "wet" ice will be used, with no use of "blue ice" or similar cold storage packets. PFAS sample coolers will be either delivered by Arcadis or laboratory courier to or shipped via FedEx Priority Overnight delivery to:

Sample Receiving
Eurofins Lancaster Laboratory Environmental
2425 New Holland Pike
Lancaster, Pennsylvania 17601

Samples will be analyzed for PFAS by U.S. EPA Method 537.1.

All disposable sampling materials will be treated as single use, and disposed appropriately after sampling at each location. Samples from each residence will be kept in their own dedicated cooler with the appropriate quality assurance samples.

8 WASTE MANAGEMENT

Typically, the tap water will be allowed to drain through the sink drain where the faucet is installed. If no sink drain below the tap water is available, the tap water will be collected in a disposable cup, and disposed via the closest drain.

9 DATA RECORDING AND MANAGEMENT

Following sample collection and shipping, the field team will demobilize back to the Arcadis local field office. The RTL and PM will organize a demobilization lessons-learned teleconference with the field team to capture any lessons that can be shared across the project with other field teams via a team SharePoint site. This will ensure continuous programmatic enhancement of field execution delivery to USAEC and USACE. The field team will draft a letter trip report to capture a summary of their field activities and any issues that they faced and will include a copy of their field forms as an appendix. The trip report will undergo internal review by RTL and PM, and will be submitted to Installation POC and USAEC.

Results letters will be provided to the well owners/users within approximately five weeks of sample collection, barring unforeseen delays in receipt of laboratory analytical results. If the combined PFOA/PFOS values at a well were below the HAL for past sampling events, but are above the HAL for future sampling events, then a phone call will be placed to the well owner/user within two days of completing the preliminary data quality review for the laboratory results for that sample.

10 QUALITY ASSURANCE

Avoiding cross-contamination from PFAS-containing materials during this sampling will be of utmost importance given the very low detection limits for the analyses that will be conducted for these compounds. As such, materials with the potential to contain PFAS will not be used during the sampling (including PTFE pipe tape, pipe thread pastes that contain PTFE, PTFE sample tubing, food wrappers, water resistant/proof clothing, waterproof field books, etc.)

Sample information, including sample ID and date/time collected, will be recorded on the provided bottle labels and attached to the sample bottles immediately after sealing the bottles. This information also will be recorded on the COC form provided by the laboratory, in a Potable Water Supply Sample Log, and in the sampling team's field notes. A signed copy of the COC form will be provided to the laboratory whenever a sample cooler is delivered to the laboratory. A copy of each COC form will be kept with the field notes and sample logs.

After receipt from the laboratory, Arcadis will conduct a preliminary data quality review (Level 2 data validation). The sample results will be communicated to well owners/users after completion of the preliminary data quality review, as outlined in the "Project Communication" section below. After completion of the preliminary data quality review, Arcadis will conduct a more comprehensive validation of the data (Level 4 data validation). The timeframe for the Level 4 validation may vary based on the amount of time required for the laboratory to send additional Quality Assurance/Quality Control information to Arcadis, and the number of samples under review. The anticipated timeframe for completion of Level 4 validation is approximately 8 weeks after sample collection, assuming timely delivery of results from the laboratory. If any changes to the reported sampling results become necessary after completion of the Level 4 validation, the well owners/users, PICA, USACE, USAEC, NJDEP, and EPA will be notified of those changes.

11 REFERENCES

U.S. Army Corps of Engineers – Omaha District. 2016. Chemistry Requirements – PFAS.

U.S. Environmental Protection Agency. 2009. USEPA Method 537: Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS), version 1.1, September. National Exposure Research Laboratory, Office of Research and Development.

Transport Canada. February 2016, Per-and Polyfluorinated Alkyl Substances (PFAS) Field Sampling Guidance.

United States Environmental Protection Agency (USEPA). 2013. Operating Procedure: Potable Water Supply Sampling. USEPA Region 4 Science and Ecosystem Support Division, Athens, Georgia (May 30, 2013) SESDPROC-3050R3.

12 ATTACHMENTS

Attachment A - Example Right-of-Entry (Missing)

Attachment B – Private Well Sampling Log

Attachment C - Example Private Well Questionnaire

ATTACHMENT A

Example Right-of-Entry

ATTACHMENT B

Private Well Sampling Log

ARCADIS Design & Consultancy for natural and built assets

Private Well Sampling Log

Sampling Personnel: _____ Date: _____

Purge Time: Begin:_____ End: _____ Weather: _____

Sampling Location Address: _____

Sampling Location (i.e., before/after treatment system. Inside tap, outside tap, etc. _____

_____

Sketch of Sample Location and Specific Site Features

Is there a water softener upstream of the sampling location? _____

Are there any other wells on the property? _____

Approximate Flow Rate During Sampling: _____

How was the Flow Rate Measured? _____

Gallons Purged (Estimate): _____

Purge water Observations (Color, Odor, etc.): _____

_____

Constituents, No of Containers, Container Type, and Preservative: _____

_____

Sample ID: _____

QA/QC or Duplicate Sample Collected at this Location? _____

Other Observations On-Property (basement, septic tank, work shop, signs of spills or disposal area, etc.)

_____

Other Observations Off-Property (locations and names of the following within close proximity to property; gas stations, automobile repair shops, car washes and any industrial property)

_____

_____

Sample Team Lead Signature: _____

ATTACHMENT C

Example Private Well Questionnaire

PRIVATE WELL QUESTIONAIRE

United States Army Corps of Engineers, New York District

Picatinny Arsenal

Property Owner Name(s):	
Street Address:	
City/State/Zip:	
Mailing Address: (leave blank if the same as above)	
Phone:	Email:

Is this rental a unit? (Please circle) YES NO

If rental, please provide the following:

- Owner Name:
- Owner Phone:
- Tenant Name:
- Tenant Phone:

Number of Occupants:

Depth of Well (in feet):

Do you use your well for drinking water? (Please circle) YES NO

Do you treat your water? (Please circle) YES NO

If YES: (Please circle) Water Softener
Carbon Filtration Unit
Reverse Osmosis
Other (Please specify):

If YES, can the treatment unit be bypassed to collect an untreated sample? (Please circle) YES NO

Does your property have a septic tank? (Please circle) YES NO

If YES, please indicate where the septic tank is located on the property.

Has your well been previously tested for PFAS? (Please circle) YES NO (If YES, please provide a copy of the test results.
To help expedite scheduling, please indicate if we may use an outdoor spigot to collect a water sample during business hours. (Please circle) YES NO
Thank you for taking the time to fill out this form. Kindly return it to our office in the enclosed self-addressed stamped envelope at your earliest convenience. Please use the back of this form for any additional contact information or details about your well.

ARCADIS Design & Consultancy for natural and built assets